
**Acoustics — Laboratory measurement of
sound insulation of building elements —**

Part 1:

Application rules for specific products

*Acoustique — Mesurage en laboratoire de l'isolation acoustique des
éléments de construction —*

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Partie 1: Règles d'application pour produits particuliers

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ISO 10140-1:2010

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10140-1 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 2, *Building acoustics*.

This first edition of ISO 10140-1, together with ISO 10140-2, ISO 10140-3, ISO 10140-4 and ISO 10140-5, cancels and replaces ISO 140-1:1997, ISO 140-3:1995, ISO 140-6:1998, ISO 140-8:1997, ISO 140-10:1991, ISO 140-11:2005 and ISO 140-16:2006, which have been technically revised.

It also incorporates the Amendments ISO 140-1:1997/Amd.1:2004 and ISO 140-3:1995/Amd.1:2004.

ISO 10140 consists of the following parts, under the general title *Acoustics — Laboratory measurement of sound insulation of building elements*:

- *Part 1: Application rules for specific products*
- *Part 2: Measurement of airborne sound insulation*
- *Part 3: Measurement of impact sound insulation*
- *Part 4: Measurement procedures and requirements*
- *Part 5: Requirements for test facilities and equipment*

Introduction

ISO 10140 (all parts) concerns laboratory measurement of the sound insulation of building elements (see Table 1).

This part of ISO 10140 specifies the application rules for specific elements and products, including specific requirements for preparation, mounting, operating and test conditions. ISO 10140-2 and ISO 10140-3 contain the general procedures for airborne and impact sound insulation measurements, respectively, and refer to ISO 10140-4 and ISO 10140-5 where appropriate. For elements and products without a specific application rule described in this part of ISO 10140, it is possible to apply ISO 10140-2 and ISO 10140-3. ISO 10140-4 contains basic measurement techniques and processes. ISO 10140-5 contains the requirements for test facilities and equipment. For the structure of ISO 10140 (all parts), see Table 1.

ISO 10140 (all parts) was created to improve the layout for laboratory measurements, ensure consistency and simplify future changes and additions regarding mounting conditions of test elements in laboratory and field measurements. It is intended for ISO 10140 (all parts) to present a well-written and arranged format for laboratory measurements.

It is intended to update this part of ISO 10140 with application rules for other products. It is also intended to incorporate ISO 140-18 into ISO 10140 (all parts).

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Table 1 — Structure and contents of ISO 10140 (all parts)

Relevant part of ISO 10140	Main purpose, contents and use	Detailed content
ISO 10140-1	It indicates the appropriate test procedure for elements and products. For certain types of element/product, it can contain additional and more specific instructions about quantities and test element size and about preparation, mounting and operating conditions. Where no specific details are included, the general guidelines according to ISO 10140-2 and ISO 10140-3.	Appropriate references to ISO 10140-2 and ISO 10140-3 and product-related, specific and additional instructions on: <ul style="list-style-type: none"> — specific quantities measured; — size of test element; — boundary and mounting conditions; — conditioning, testing and operating conditions; — additional specifics for test report.
ISO 10140-2	It gives a complete procedure for airborne sound insulation measurements according to ISO 10140-4 and ISO 10140-5. For products without specific application rules, it is sufficiently complete and general for the execution of measurements. However, for products with specific application rules, measurements are carried out according to ISO 10140-1, if available.	<ul style="list-style-type: none"> — Definitions of main quantities measured — General mounting and boundary conditions — General measurement procedure — Data processing — Test report (general points)
ISO 10140-3	It gives a complete procedure for impact sound insulation measurements according to ISO 10140-4 and ISO 10140-5. For products without specific application rules, it is sufficiently complete and general for the execution of measurements. However, for products with specific application rules, measurements are carried out according to ISO 10140-1, if available.	<ul style="list-style-type: none"> — Definitions of main quantities measured — General mounting and boundary conditions — General measurement procedure — Data processing — Test report (general points)
ISO 10140-4	It gives all the basic measurement techniques and processes for measurement according to ISO 10140-2 and ISO 10140-3 or facility qualifications according to ISO 10140-5. Much of the content is implemented in software.	<ul style="list-style-type: none"> — Definitions — Frequency range — Microphone positions — SPL measurements — Averaging, space and time — Correction for background noise — Reverberation time measurements — Loss factor measurements — Low-frequency measurements — Radiated sound power by velocity measurement
ISO 10140-5	It specifies all information needed to design, construct and qualify the laboratory facility, its additional accessories and measurement equipment (hardware).	<p>Test facilities, design criteria:</p> <ul style="list-style-type: none"> — volumes, dimensions; — flanking transmission; — laboratory loss factor; — maximum achievable sound reduction index; — reverberation time; — influence of lack of diffusivity in the laboratory. <p>Test openings:</p> <ul style="list-style-type: none"> — standard openings for walls and floors; — other openings (windows, doors, small technical elements); — filler walls in general. <p>Requirements for equipment:</p> <ul style="list-style-type: none"> — loudspeakers, number, positions; — tapping machine and other impact sources; — measurement equipment. <p>Reference constructions:</p> <ul style="list-style-type: none"> — basic elements for airborne and impact insulation improvement; — corresponding reference performance curves.

Acoustics — Laboratory measurement of sound insulation of building elements —

Part 1: Application rules for specific products

1 Scope

This part of ISO 10140 specifies test requirements for building elements and products, including detailed requirements for preparation, mounting, operating and test conditions, as well as applicable quantities and additional test information for reporting. The general procedures for airborne and impact sound insulation measurements are given in ISO 10140-2 and ISO 10140-3, respectively.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 717-1:1996, *Acoustics — Rating of sound insulation in buildings and of building elements — Part 1: Airborne sound insulation*

ISO 717-2, *Acoustics — Rating of sound insulation in buildings and of building elements — Part 2: Impact sound insulation*

ISO 10140-2, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 2: Measurement of airborne sound insulation*

ISO 10140-3, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 3: Measurement of impact sound insulation*

ISO 10140-5:2010, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 5: Requirements for test facilities and equipments*

3 General

General requirements regarding boundary conditions and mounting of the test element in the laboratory are specified in ISO 10140-2, ISO 10140-3 and ISO 10140-5. Additional and more detailed requirements regarding preparation, mounting and operating conditions, and conditioning are given in Annexes A, B, C, D, E, F, G, H and I.

NOTE For products which are not covered by Annexes A, B, C, D, E, F, G, H or I, a new annex can be added, based on available knowledge and practice. The preferred structure of annexes is specified in Clause 4.

When testing in accordance with ISO 10140 (all parts), this part of ISO 10140 shall always be checked for requirements relating to specific elements and products. The basic conditions specified in ISO 10140-2 or ISO 10140-3 shall always be followed.

4 Structure of application rules for specific products

To extend or update the Annexes A, B, C, D, E, F, G, H and I, or to prepare a new annex with application rules for specific products, the required contents are listed below. For some elements or products, certain items might not be relevant. The purpose is to describe boundary, mounting and operating conditions for specific elements, products or groups of products.

- a) Application:
 - 1) definition of the element/product it applies to;
 - 2) quantities measured (if needed);
 - 3) reference to test method(s).
- b) Test element:
 - 1) size of the test opening and the test element;
 - 2) number of test elements.
- c) Boundary and mounting conditions (should be applied before installation):
 - 1) boundary conditions, e.g. filler wall, element boundaries;
 - 2) mounting positions;
 - 3) installation of the test element in the test opening.
- d) Test and operating conditions (should be applied after installation):
 - 1) operating conditions, e.g. open/close before test;
 - 2) conditioning/curing/drying;
 - 3) loading;
 - 4) environmental conditions.
- e) Test report.
- f) Additional information: if necessary, any information additional to the information that is required in basic ISO 10140-2 and ISO 10140-3.

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Annex A (normative)

Walls — Airborne sound insulation

A.1 Application

For walls and other partitions, ISO 10140-2 applies. This annex applies to lightweight twin leaf partitions, such as those constructed of gypsum boards.

The quantity determined is the sound reduction index, R , as a function of frequency. The definition of R is given in ISO 10140-2.

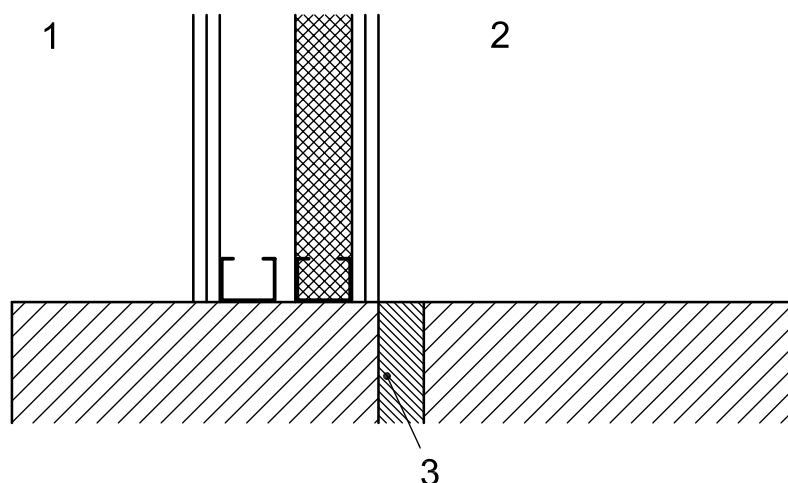
The general guidelines in the relevant clauses of the basic ISO 10140-2 shall always be followed.

A.2 Test element

The test opening for walls should be approximately 10 m².

A.3 Boundary and mounting conditions

The sound reduction index of lightweight twin leaf partitions (e.g. twin leaf gypsum board walls) is influenced by the mounting conditions in the test opening of the laboratory. Important installation parameters include the niche depth and the position of the partition in relation to the acoustic break in the test aperture.



Key

- 1 source room
- 2 receiving room
- 3 acoustic break of the laboratory

Figure A.1 — Example of the position of the test element relative to the acoustic break of the laboratory

ISO 10140-1:2010(E)

To improve the reproducibility between laboratories and facilitate comparison of sound reduction indices for different lightweight double walls, the twin leaf partition shall not be mounted across the acoustic break of the laboratory, but on the same side of the break, as indicated in Figure A.1. The aperture should meet the requirements in ISO 10140-2.

Other mounting conditions may be used but shall be fully described in the test report.

NOTE 1 Mounting the lightweight partition with one leaf on one side and the other leaf on the other side of the acoustic break can result in higher values for the sound reduction index.

NOTE 2 Other mounting conditions can be suitable for certain types of twin leaf walls, for example walls for semi-detached houses where the leaves are vibrationally uncoupled (for example on separate foundations). In such cases, the wall leaves can be mounted on each side of the acoustic break.

A.4 Test and operating conditions

The test and operating conditions are given in ISO 10140-2.

A.5 Test report

The test report is given in ISO 10140-2.

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Annex B (normative)

Doors — Airborne sound insulation

B.1 Application

This annex applies to internal and external doors (including door sets).

The quantity determined is the sound reduction index, R , as a function of frequency. The definition of R is given in ISO 10140-2.

The general guidelines in the relevant clauses of the basic ISO 10140-2 shall always be followed.

NOTE For a definition of door, see ISO 1804 and EN 12519.

B.2 Test element

For most doors, a test opening with an area of less than 10 m² is needed. The area of the test element, S , is the area of the opening in the filler wall required to accommodate the door.

B.3 Boundary and mounting conditions

The test opening for doors shall be arranged such that the lower edge is situated near to the level of the floor of the test rooms and such that conditions in the building are reproduced. The door shall be installed for test such that it can be opened and closed in the normal manner.

B.4 Test and operating conditions

The door shall be opened and closed at least five times immediately before testing.

B.5 Test report

The test report is given in ISO 10140-2.

Annex C (normative)

Windows — Airborne sound insulation

C.1 Application

This annex applies to windows.

The quantity determined is the sound reduction index, R , as a function of frequency. The definition of R is given in ISO 10140-2.

The general guidelines in the relevant clauses of ISO 10140-2 shall always be followed.

NOTE For a definition of window (terminology), see EN 12519.

C.2 Test element

The preferred dimensions of the test opening for a window are 1 250 mm × 1 500 mm as for the specific small-sized test opening described in ISO 10140-5, but variations from this size can be necessary in recognition of national building practice. For windows, the test opening may be staggered as shown in Figure 3 of ISO 10140-5:2010. In the case of a window assembly, dimensions may be chosen as representative of the assembly used in practical circumstances. For windows, the area, S , is the area of the opening in the filler wall required to accommodate the test element.

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C.3 Boundary and mounting conditions

The installation of a window assembly shall be as similar as possible to the method which would be used in practice. When the window is mounted in the test opening, the niches on both sides of the windows shall have different depths, preferably in a ratio of about 2:1, unless this conflicts with the particular design of the window. However, it is expected that results obtained with niche depths of different ratios would differ.

The gap between the window and the test opening (about 10 mm to 13 mm around the window when mounted in the test opening) should be filled with absorbing material (for example mineral wool) and made airtight using an elastic sealant on both sides or in accordance with the manufacturer's instructions.

If the test element is intended to be readily openable, it shall be installed for the test in such that a way it can be opened and closed in the normal manner.

C.4 Test and operating conditions

C.4.1 Conditioning

The sound insulation of certain glazing systems or elements, especially those incorporating laminated glass, can depend on the room temperature during the measurements. The temperature of both rooms used for measuring the sound insulation should be (20 ± 3) °C. The test elements should be stored for 24 h at the test temperature. In addition, it can be advantageous to make measurements at temperatures similar to those for which the test element is designed.

C.4.2 Operation

If the test element is intended to be openable, it shall be opened and closed at least five times immediately before testing.

C.5 Test report

The test report is given in ISO 10140-2.

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